# THE TECHNICAL APPROACH: THE IAEA ACTION PLAN ON THE SAFETY OF RADIATION SOURCES

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**Abstract.** As part of the measures to strengthen international co-operation in nuclear, radiation and waste safety, the report refers to the implementation of the *Action Plan for the Safety of Radiation Sources and the Security of Radioactive Materials*. Starting with background information, the report references the main results of the Dijon Conference and of General Conference resolution GC(42)/RES/12 in September 1998, describing the actions taken by the Secretariat pursuant such resolution and also by the Board of Governors, in its sessions of March and September 1999, as well as by the General Conference, in October 1999 when by resolution GC(43)/RES/10 the *Action Plan* was endorsed and the Secretariat was urged to implement it. Finally, the report provides information on the status of implementation of the seven areas covered by the *Action Plan* and on the suggested further actions to be carried out for its implementation taking into account the decisions of the Board in its meeting of 11 September 2000 and the resolutions GC(44)/RES/11, GC(44)/RES/13 and GC(44)/RES/16 of the forty-fourth regular session of the General Conference.

## BACKGROUND

Radiation sources, utilizing either radioactive materials or radiation generators, are used throughout the world for a wide variety of beneficial purposes, in industry, medicine, research, defense and education. The risks posed by these sources and materials vary widely, depending on the activities, the radionuclides, the forms, etc. Unless damaged or leaking, sealed sources present a risk from external radiation exposure only. Damaged or leaking sealed sources as well as unsealed radioactive materials may however lead to contamination of the environment and intake of radioactive materials into the human body.

The risks associated with the planned use of radioactive sources or materials are generally well known and the relevant safety requirements generally well identified. Nevertheless, accidents can occur during use. In recent years there has been a growing awareness of the potential for such accidents, some accidents having had serious, even fatal, consequences. The attention of the radiation protection community has therefore become focused on the prevention of accidents involving the use of such sources.

More recently still, there has been a growing awareness of the problems associated with radiation sources that for one reason or another are not subject to regulatory control or over which regulatory control has been lost. As the sources may be transported across borders, such problems are not necessarily restricted to the State within which the sources were originally used. Such sources are commonly referred to as 'orphan sources', a term which is taken here to include sources that were never subject to regulatory control but should have been, or sources that were subject to regulatory control but have been abandoned, or sources that were subject to regulatory control but have been lost or misplaced, and or sources that were subject to regulatory control but have been stolen or removed without proper authorization. The number of such sources in the world is not known, but it is thought to be substantial.

Sealed sources can be attractive because of their shiny metallic appearance or their apparent value as scrap. Subsequent recovery of these sources by workers and members of the public,

who are unaware of the possible hazards, can result in external irradiation or, if tampered with, the possibility of internal exposure. This has led to serious injury and in several cases death. There is also the possibility of the sources being incorporated into scrap metal for subsequent recycling, leading to contamination of the plant and environment possibly causing serious economic consequences. International trade in scrap metal means that such material can be transferred from one country to another.

Many of these radiation sources originate from medical or industrial uses. Some however originate from defense activities, knowledge of which may not have been available to the civil authorities.

*DIJON CONFERENCE*

In September 1998, an international conference took place in Dijon, France, on the Safety of Radiation Sources and the Security of Radioactive Materials. This conference was an important international attempt to address the growing concern about the safety of radiation sources and the security of radioactive materials, where the following conclusions were raised:

- radiation sources should not be allowed to drop out of the regulatory control system (meaning that the regulatory authority must keep up-to-date records of those responsible for each source, monitor transfers of sources and track the fate of each source to the end of its useful life);
- efforts should be made to find radiation sources that are not in the regulatory authority's inventory (because they were in the country before the inventory was established, or were never specifically registered/licensed or were lost, abandoned or stolen); and
- efforts to improve the detection of radioactive materials crossing national borders and moving within countries by carrying out radiation measurements and through intelligence-gathering should be intensified (optimum detection techniques need to be developed, and confusion would be avoided if international agreement could be achieved on quantitative levels that would trigger investigations, for example, at border crossings).

*GENERAL CONFERENCE RESOLUTION GC(42)/RES/12*

A report on the Dijon Conference was considered by the IAEA's General Conference at its meeting in September 1998 and the concern expressed about orphan sources led to the adoption of resolution GC(42)/RES/12, in which the General Conference — inter alia — encouraged all governments *"to take steps to ensure the existence within their territories of effective national systems of control for ensuring the safety of radiation sources and the security of radioactive materials"*. This resolution was brought to the attention of Member States and the Secretariat later in December 1998 recalled that the Agency had established *International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources* (the BSS) and that it was ready to provide for the application of the BSS at the request of a State to any activity in that State involving radiation sources.

In that resolution, the Secretariat of the IAEA was also requested *"to prepare for the consideration of the IAEA's Board of Governors, a report on*:

(i) *how national systems for ensuring the safety of radiation sources and the security of radioactive materials can be operated at a high level of effectiveness and*
(ii) *whether international undertakings concerned with the effective operation of such systems and attracting broad adherence could be formulated".*

*ACTIONS TAKEN BY THE BOARD OF GOVERNORS AND THE GENERAL CONFERENCE*

Responding to the General Conference resolution GC(42)/RES/12, the Agency called for a group of senior consultants to prepare a report which was considered at the March 1999 Meeting of the Board of Governors. During this session, the Board noted the conclusions and recommendations set forth in the experts' report and requested the Director General to bring the report to the attention of national authorities by distributing it to all States, encouraging them, in particular, to:

- establish or strengthen national systems of control for ensuring the safety and security of radiation sources, particularly legislation and regulations and regulatory authorities empowered to authorize and inspect regulated activities and to enforce the legislation and regulations;
- provide their regulatory authorities with sufficient resources, including trained personnel, for the enforcement of compliance with relevant requirements; and
- consider installing radiation monitoring systems at airports and seaports, at border crossings and at other locations where radiation sources may appear (such as metal scrap yards and recycling plants), develop adequate search and response strategies, arrange for the training of staff and the provision of equipment to be used in the event that radiation sources are detected, and take similar urgent actions.

In addition, the Secretariat was requested to prepare an *Action Plan* that took into account the conclusions and recommendations in and the Board's discussion of the report. The Director General was also requested to initiate exploratory discussions relating to an international undertaking in the area of the safety and security of radiation sources, which might take the form of a convention or some other type of instrument providing for a clear commitment by and attract the broad adherence of States, as well as authorized him to include the report in a document to be submitted to the General Conference for consideration at its next (1999) regular session.

Following it, the Director General in May 1999 distributed the report to all States requesting them to transmit it to the relevant national authorities in their countries and inviting them to submit their countries' views regarding the nature and scope of an international undertaking in the area of the safety and security of radiation sources. Later the Secretariat prepared the *Action Plan* and, on 20 September 1999, the Board approved it [Attachment 2 to document GOV/1999/46-GC(43)/10] and requested the Secretariat its implementation.

Consequently, on 1 October 1999, in resolution GC(43)/RES/10, the General Conference endorsed the Board's decision, urged the Secretariat to implement the *Action Plan* and requested the Director General to report at its forty-fourth (2000) regular session on the implementation of this resolution. Therefore, this year the General Conference in its resolution GC(44)/RES/11 endorsed the actions taken by the Board of Governors on 11 September 2000 in respect of document GC(44)/7 on the implementation of the Action Plan for the Safety of

Radiation Sources and the Security of Radioactive Materials; invited Member States to take note of the Code of Conduct on the Safety and Security of Radioactive Sources and to consider, as appropriate, means of ensuring its wide application; and urged Member States to take steps to help ensure that the *International Conference of National Regulatory Authorities with competence in the Safety of Radiation Sources and the Security of Radioactive Materials,* to be held in Buenos Aires, Argentina, from 11 to 15 December 2000, is well attended, particularly by participants from developing countries.

The General Conference in its resolution GC(44)/RES/13 also stressed the special importance of education and training in radiation protection and nuclear safety and waste management, and urges the Secretariat to implement all the actions mentioned in the document GOV/2000/34-GC(44)/7 (attachment 6) and to strengthen, within available financial resources, its current efforts in this area, in particular to assist Member States at regional and national training centres that would arrange for such education and training to be conducted in the relevant official languages of the Agency.

Additionally, in resolution GC(44)/RES/16 the General Conference encourages Member States to implement instruments for improving their response, in particular their contribution to international response, to nuclear and radiological emergencies, as well as to participate actively in the process of strengthening international, national and regional capabilities for responding to nuclear and radiological emergencies and to make those capabilities more consistent and coherent. This resolution also requests the Director General to continue to evaluate and, if necessary, improve the capability of the IAEA Emergency Response Centre to fulfil its role.

## IMPLEMENTATION OF THE *ACTION PLAN*

The primary purpose of the *Action Plan* is to enable the Agency to develop and implement activities that will assist States in maintaining and, where necessary, improving the safety of radiation sources and the security of radioactive materials over their life cycle. Consideration is given to fostering a safety culture, including the development of effective regulatory infrastructures, and to the education and training and oversight of those responsible for radiation sources and radioactive materials. In particular, the training of the staff of organizations that use radiation sources or radioactive materials should lead to the development of an increased sense of responsibility and safety culture so as to ensure that operations are undertaken safely and the sources and materials are kept secure.

Even with an effective regulatory infrastructure, the possibility remains that sources may escape control , and States need to be able to respond appropriately. Consideration is therefore given in the *Action Plan* to the further strengthening of the Agency's programme for the provision of support in such circumstances. This includes consideration of the need to train the staff of regulatory authorities in how to respond to orphan sources should such be discovered and in developing a plan for ensuring proper recovery and disposition of the sources.

While the *Action Plan* covers all such uses, it is recognized that the focus should be on those radiation sources and materials which pose the most significant risks. Primary consideration is therefore given to sealed radiation sources with relatively high levels of radioactivity which might necessitate interventional measures should control over them be lost. The *Action Plan*

therefore calls for the categorization of sources as the basis for a graded approach to regulatory control.

A special aspect of the orphan source problem is the impact on persons or organizations that do not normally handle radioactive sources but may be at risk from them nonetheless. Examples include scrap metal recyclers and landfill operators. The *Action Plan* therefore also addresses the need to disseminate information to such persons and organizations regarding the types of sources that they may encounter and the actions to be taken if such sources are discovered.

The initiation by the Director General of exploratory discussions relating to an international undertaking is also included in the *Action Plan.*

Therefore, the regulatory components of the *Action Plan* comprise activities aimed at:

- strengthening national regulatory programmes covering notification and authorization (by either licensing or registration), the safety of radiation sources and security of radioactive materials, and the storage or disposal of disused sources;
- detection and emergency response; and
- recovery and remediation.

Training is an essential part of all these activities above.

The supporting components of the *Action Plan* are aimed at persons or organizations having an interest in seeing that the orphan source problem is addressed. These include metal recyclers, metallurgical plants and non-radioactive waste disposal facilities. Manufacturers, suppliers and distributors of radiation sources/devices and monitoring/detection systems are also part of this group.

The proposed new initiatives regarding the safety of radiation sources and the security of radioactive materials, including the problem of orphan sources, are grouped in seven areas which provide a logical division of tasks to be carried out by the Agency: *Regulatory Infrastructures, Management of Disused Sources, Categorization of Sources, Response to Abnormal Events, Information Exchange, Education and Training,* and *International Undertakings.* The *Action Plan* foresees one or more actions in each area (the actions and their status are described in attachments 1–7 to the document GOV/2000/34-GC(44)/7).

**Regulatory Infrastructures**

***Action:***

*To establish a service for advising States on the establishment of appropriate regulatory programmes.*

In order to assist States in ensuring compliance with the relevant requirements concerning regulatory infrastructures in the BSS, the Secretariat has established a Radiation Safety Regulatory Infrastructure (RSRI) service for:

- carrying out, at the request of States, assessments of the effectiveness of radiation safety regulatory infrastructures, identifying weaknesses and making recommendations for improvement; and
- assisting, at the request of States, with the organization of radiation safety regulatory infrastructures and the associated regulatory programmes and advising on how to operate those programmes and on matters such as the functions of regulatory authorities, the application of international standards, and the drafting of regulations consistent with international standards.

Therefore, on 11 September 2000, the Agency's Board of Governors — inter alia — encouraged Member States *"to avail themselves of the Secretariat's services relating to the development and review of regulatory infrastructures, and in particular to make use of the Radiation Safety Regulatory Infrastructure (RSRI) service recently established by the Secretariat"*. Further details about the RSRI service and information about the other Secretariat services relating to the development and review of regulatory infrastructures can be obtained from the Division of Radiation and Waste Safety in the Agency's Department of Nuclear Safety.

**Management of Disused Sources**

***Action:***

*To prepare documents on particular aspects of the handling and disposal of disused radioactive sources.*

The Secretariat is preparing technical documents (IAEA-TECDOCs) for:

- the management of high-activity disused sources (meaning a radioactive source no longer intended to be used for its original purpose) describing the proper handling, conditioning and disposal of sources which are no longer suitable for their initial purpose but still have high activities (e.g. teletherapy and industrial radiography sources, considering that such sources have been the main cause of serious accidents with disused sealed sources);
- establishing procedures for conditioning and storing long-lived disused sources (e.g. sources containing radium-226 or americium-241 and various neutron-emitting sources) describing procedures for managing (conditioning/storing) of long-lived disused sources and equipment containing such sources, which require proper management for as long as they are not disposed of (perhaps several decades); and
- disused sealed source management involving storage/disposal in boreholes summarizing current practices involving the use of boreholes for the storage/disposal of disused sealed sources.

***Action:***

*To organize consultations and workshops on technical, commercial, legal and regulatory aspects of the return of disused sources to manufacturers and on the management of disused sources with long-lived radionuclides and of equipment containing such sources.*

The Secretariat has initiated informal consultations with major source manufacturers about various aspects of the return of disused sources to manufacturers. All the manufacturers

contacted so far have expressed a willingness to attend meetings organized by the Secretariat with a view to elaborating various return options and subsequently developing a strategy.

In this connection, the Secretariat intends to convene a Technical Committee meeting to consider possible strategies for the return of disused sources in order that the radioactive materials in them may be recycled (i.e. used in the manufacture of new sources) and also is planning workshops for the purpose of developing a strategy for the conditioning and storage of long-lived disused sources and equipment containing such sources.

**Categorization of Sources**

***Action:***

*To prepare a document on the categorization of sources on the basis of the associated potential exposures and radioactive contamination.*

A Technical Committee developed a *Categorization of Radiation Sources,* which is based on the following five attribute groupings: Radiological Properties, Form of Material, Practice or Activity, Exposure Scenarios and End of Life Considerations. This categorization was confined to sealed radioactive material sources.

Sources are ranked according to the harm they could cause, so that the controls to be applied will be commensurate with the radiological risks which the sources (and the materials contained in them) present. The resulting categories are:

- *Category 1 (higher risk):* industrial radiography sources, teletherapy sources, irradiators;
- *Category 2 (medium risk):* brachytherapy sources (with both high and low dose rates), fixed industrial gauges with high-activity sources, well logging sources; and
- *Category 3 (lower risk):* fixed industrial gauges with lower-activity sources.

The above general categorization provides an indication of the priority which a regulatory authority should assign when establishing a regulatory infrastructure and trying to bring sources under regulatory control. It would also be relevant to decisions regarding: notification and authorization of use (by registration or licensing); security requirements, during manufacture, transport, storage, use, transfer, repair, decommissioning or disposal; and emergency preparedness. It is designed to serve as guidance for all regulatory authorities, and will be used by the Secretariat in discharging the Agency's functions and responsibilities with regard to the safety of radiation sources and the security of the radioactive materials which are under its control or supervision.

On 11 September 2000, the Board of Governors authorized the Director General to issue the Categorization of Radiation Sources and invited Member States to draw on it as appropriate. The document is being issued as a TECDOC.

**Response to Abnormal Events**

***Action:***

*To prepare guidance on national strategies and programmes for the detection and location of orphan sources and their subsequent management.*

The Secretariat carried out a systematic review of the overall nature of the orphan source problem and identified areas in a model national strategy for the detection and location of orphan sources that need special attention and further development. From the review it was concluded that sources get out of control mainly through:

- loss during use or (in the case of mobile sources) in transit;
- being abandoned or their control being relinquished; and
- theft for scrap or illicit trafficking (particularly when sources are inadequately stored).

It was recognized that there may also be a "historical legacy" (meaning no control systems in place when the sources were used). Locations with a possible "historical legacy" include hospitals and industrial and military sites.

Whether control has been lost or did not exist in the first place, the consequences are that sources may cross borders, be mixed with scrap metal, or be sent to a landfill site or incinerator for disposal. National strategies therefore need to include the following elements:

- actions to bring sources that are in a vulnerable state (for example, in inadequate storage) under firm control;
- programmes for investigating sites where the presence of abandoned sources is suspected;
- detection systems at border crossings, scrap yards, and landfill sites or incinerators;
- intelligence gathering (for cases of illicit trafficking); and
- arrangements for responding to abnormal events which do not necessarily constitute emergencies (for example, the finding of a source).

Some of these elements will have substantial resource implications, and priorities will therefore have to be assigned. These elements are to be considered in a technical document which will define a model national strategy. This is expected to be finalized towards the end of 2001.

In the light of a number of very serious radiation accidents resulting from the inadequate storage of sources, the Secretariat prepared and distributed to States a leaflet containing guidance on the action which should be taken when sources are inadequately stored.

Various draft documents which touch on the question of national strategies for dealing with orphan sources (i.e. documents on regulatory infrastructure, emergency preparedness and response, and combating illicit trafficking in radioactive materials) will be reviewed also to ensure that the issues covered by them are dealt with in a harmonized manner.

***Action:***

*To formulate criteria for the development, selection and use of detection and monitoring equipment at border crossings, ports of entry, ports of exit, and scrap yards and other facilities.*

The Secretariat has begun formulating criteria for the development, selection and use of radiation detection and monitoring equipment intended for use at border crossings, ports of entry, ports of exit, scrap yards and other facilities. Priority is being given to the detection of

sources belonging to *Category 1(higher risk)* as defined in the *Categorization of Radiation Sources.*

***Action:***

*To develop further national response capabilities for dealing with radiological emergencies.*

***Technical documents and manuals***

The Secretariat is preparing — for publication next year — a revised edition of the IAEA TECDOC-953: "Methods for the development of emergency response preparedness for nuclear or radiological accidents", which will cover also the detection and location of orphan sources and their subsequent management.

The Secretariat published in August 2000 the IAEA-TECDOC-1162: "Generic procedures for assessment and response during a radiological emergency". This technical document, which is in the form of a manual for emergency managers, first responders, on-scene controllers and radiological assessors, should be helpful to States in developing radiological emergency response systems and training personnel to respond effectively to radiological emergencies.

Since radiological emergencies are sometimes recognized as such only after the appearance of medical symptoms, and delays in responding can lead to unnecessary exposure and even death, it is essential that medical professionals presented with symptoms of radiation exposure be able to identify them as symptoms of radiation-related pathological conditions and recognize that they may result from a radiological emergency which requires an appropriate response. Consequently, the Secretariat has published a leaflet on "How to Recognize and Initially Respond to an Accidental Radiation Injury" for general practitioners and for medical school students and their instructors. The leaflet (in Arabic, Chinese, English, French, Russian and Spanish) will be made available via the public web-sites of the Agency and the World Health Organization. The Secretariat intends — after consultations with the World Health Organization — to start work on the development of a practical emergency response manual designed to help medical doctors and paramedics deal with radiation injuries.

***Training materials***

In support of its "train the trainers" approach to assisting with the development of national response capabilities, the Secretariat is continuing to develop standardized training materials matching the various technical documents on emergency planning, preparedness and response which have been or are to be published. The materials are to be produced in a number of languages in order to facilitate their wide use in Agency technical co-operation projects. The Secretariat's ultimate goal is to publish all the training materials in hard-copy form; meanwhile, the already existing training materials are being made available to identified "trainers" in Member States on CD-ROM. The Secretariat has prepared a CD-ROM containing material for an "Awareness Training Course for Customs and Police Investigators on Combating Nuclear Smuggling".

***Development of national and regional response capabilities***

To increase awareness of the need to strengthen capabilities for responding to radiological emergencies in Member States, the Secretariat has held regional workshops — in connection

with ongoing and planned technical co-operation projects — in Europe, Latin America and the East Asia and Pacific region.

Towards the end of 1999, shortly before the Panama Canal was placed under the jurisdiction of Panama, the Secretariat held a national workshop, in Panama City, on how to respond to radiological emergencies, including such emergencies in the Panama Canal Zone. The workshop provided an opportunity to assess the value of various documents and training materials being developed within the Secretariat.

The Secretariat is designing a model of a two-week workshop on radiological emergency management, including assessment, response and preparedness. This workshop was tested in Slovenia, on 13–24 November 2000, and will be tested in other regions in 2001. Also, the Secretariat plans to conduct workshops on the medical response to radiological emergencies in Europe and Latin America in 2001.

***Action:***

*To strengthen the Agency's existing capabilities for the provision of assistance in emergency situations.*

The Secretariat has updated its Emergency Notification and Assistance Technical Operation Manual (ENATOM), which provides guidelines to Member States, parties to the Convention on Early Notification of a Nuclear Accident (the Early Notification Convention) and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (the Assistance Convention), relevant international organizations, and other States in order that they may adopt or develop suitable mechanisms for interfacing with the Agency within the framework of those conventions.

ENATOM was first issued in January 1989, and Member States, parties to the Early Notification Convention and the Assistance Convention, relevant international organizations, and other States have regularly received notices regarding amendments. However, factors such as technological developments, new operational concepts (for example, the concept of reporting emergency-related information even when there is no obligation under the Early Notification Convention to do so) and changes in States' expectations ultimately necessitated a complete revision, which resulted in the new edition.

The Secretariat intends to monitor the use made of the new edition of ENATOM, which is due to become operational in December of this year, with a view to issuing a further updated version in July 2002. Interim changes to the new edition will, if necessary, be made through the transmission of amendment notices to ENATOM holders. To consider how to strengthen the Agency's emergency response system and to improve the operational arrangements described in the new edition of ENATOM, the Secretariat will be convening on 18–22 June 2001 in Vienna a meeting of competent authorities designated by Member States pursuant to the Early Notification Convention and the Assistance Convention. The new edition of ENATOM will be made available to Member States, parties to the Early Notification Convention and the Assistance Convention, relevant international organizations, and other States before 1 December 2000 (a pre-publication version was already available to Member States).

The Secretariat has participated — through the Inter-Agency Committee on the Response to Nuclear Accidents, which it convenes — in the development of a "Joint Radiation Emergency

Management Plan of the International Organizations" describing and clarifying — inter alia — arrangements for the provision of medical assistance, through the World Health Organization, and humanitarian assistance, through the United Nations Office for the Co-ordination of Humanitarian Affairs (OCHA). This Plan is already in printing stage and copies of it are to be made available to all Member States of the Agency by the end/beginning 2000 (a pre-publication version was already available to Member States).

To facilitate the provision of prompt assistance by parties to the Assistance Convention, the Secretariat is establishing an Emergency Response Network (ERNET) consisting of suitably qualified emergency response teams based in various Member States and drawing on regional emergency response capabilities. These teams will be available to assist the Agency in providing rapid and effective response following a request for assistance during a radiological emergency.

The Agency's Emergency Response Centre recently received, from the United States of America, a donation of mobile radiospectrometry equipment which, when installed in land vehicles or helicopters, can be used in carrying out wide-area surveys for the purpose of locating radiation anomalies due to — for example — the presence of unshielded orphan sources. A number of staff members have already been trained to use the equipment, and there are plans to establish a standardized in-house training programme. The equipment will increase the ability of the Secretariat to assist Member States.

In addition, the Agency's Emergency Response Centre has been assisted by France's Commissariat à l'Energie Atomique, which has provided technology and expertise for the location of orphan sources through aerial surveys.

Regarding all the above, recently in resolution GC(44)/RES/16, the General Conference encourages Member States *"to implement instruments for improving their response, in particular their contribution to international response, to nuclear and radiological emergencies"* and *"to participate actively in the process of strengthening international, national and regional capabilities for responding to nuclear and radiological emergencies and to make those capabilities more consistent and coherent", and* requests the Director General *"to continue to evaluate and, if necessary, improve the capability of the IAEA Emergency Response Centre to fulfil its role".*

**Information Exchange**

***Action:***

*To organize an International Conference on the Control by National Authorities of Radiation Sources and Radioactive Materials and regional workshops on specific topical issues.*

***International Conference***

The Secretariat is organizing an *International Conference of National Regulatory Authorities with competence in the Safety of Radiation Sources and the Security of Radioactive Materials*, hosted by the Government of Argentina in Buenos Aires from 11 to 15 December 2000. The main aim of the Conference is to provide a forum for an exchange of information and experience regarding the development of regulatory systems for ensuring the safety of radiation sources and the security of radioactive materials.

The Conference is directed at a broad spectrum of high-level officials and experts from national authorities concerned with the regulatory control of radiation sources and radioactive materials. It will also be of interest to senior policy- and decision-makers of other national bodies and to representatives of private sector institutions which use radiation sources and radioactive materials. The intention is to provide participants with an opportunity to present information on the situation in their respective countries regarding the regulatory control of radiation sources and radioactive materials and to discuss how, if necessary, the situation might be improved.

In this connection, in the resolution GC(44)/RES/11 the General Conference urged Member States to take steps to help ensure that the *International Conference* is well attended, particularly by participants from developing countries.

It should be noted as well that the same above resolution urges Member States to take steps to help ensure that the *International Conference on the Radiological Protection of Patients*, due to be held in Torremolinos, Spain, from 26 to 30 March 2001, is well attended and particularly by participants from developing countries.

***Regional workshops***

The Secretariat is organizing six regional workshops on the safety and security of radiation sources and radioactive materials to be held between November 2000 and the end of 2001. These workshops will be for users and manufacturers of radiation sources and for regulators. They will be open to participants from Member States of the Agency and from non-Member States.

The representatives will be encouraged to exchange information about problems encountered by them and about successes in dealing with such problems. A major topic will be the use to be made of the *Categorization of Radiation Sources*, although the items of the *Action Plan* will also be covered.

***Action:***

*To develop an international database on missing and found orphan sources or to modify an existing database so as to include such sources.*

A Technical Committee has concluded that the most efficient mechanism whereby the Secretariat might receive information on missing and found orphan sources and make it available to Member States is the 24-hour reporting system established pursuant to the Early Notification Convention and the Assistance Convention and described in ENATOM.

This Committee has worked out a configuration for an international database, procedures for the reporting of data and rules regarding access to and the security of data and has designed a reporting form. The Committee also considered that only sources belonging to the two most hazardous categories of the three-category *Categorization of Radiation Sources* are to be covered by the database. A reporting exercise, with a small number of participants, is to be carried out before the end of this year.

***Action:***

*To fully develop and maintain the international database on unusual radiation events (RADEV) and make it available to Member States.*

The Secretariat is at present carrying out in-house tests of RADEV. Later this year, the Secretariat will carry out an international trial in co-operation with a number of other organizations. If the results are satisfactory, RADEV will be made available for use by Member States in 2001.

RADEV will include summaries of reports giving the results of detailed reviews of the causes and consequences of serious radiological accidents and the lessons learned. Such reports are prepared by the Secretariat with the agreement of the States where the accidents occurred. The first such report covered the serious radiological accident that occurred in 1987 in Goiânia, Brazil. So far, the Agency has published eight such reports; five more are to be published in the near future. In addition, three reports on lessons learned from accidents which have occurred with industrial radiography sources, with industrial irradiators and in radiotherapy have been published. The publication of such reports can take a long time (up to several years), owing to the lengthy procedures involved in collecting and analyzing data and obtaining the permission of States to publish and, above all, to the need to wait and see how the medical condition of the accident victims develops. The Secretariat is therefore introducing a system for making available within a relatively short time the lessons learned from serious radiological accidents resulting, in particular, from the loss or the absence of control over radiation sources. The long-term medical follow-up of accident victims will be handled separately in collaboration with WHO.

The RADEV data based has been prepared and data are being entered. Initial statistical data from RADEV will be available by the time of the International Conference in Buenos Aires.

***Action:***

*To develop a repository of information on the characteristics of sources and of devices containing sources, including transport containers, and to disseminate the information, with consideration of the advisability of dissemination through the Internet.*

The Secretariat started work already in January 1999 on developing an information base to be used in support of the management of disused sealed sources. In February 2000, it presented the results of its preliminary work to a group of consultants, who suggested how the structure of the information base might be improved and how data might best be collected from Member States. In May 2000, the Secretariat sent to all Member States a questionnaire inviting them to provide relevant information.

The Secretariat's aim is to produce a catalogue which contains information on radiation sources and on devices containing such sources, including guides to facilitate the identification of sources and devices on the basis of radioactive characteristics and to facilitate visual identification on the basis of outward appearance (e.g. shape, size and labels). Completion of the software design phase and of the inputting of available data is tentatively scheduled for the end of March 2001.

**Education and Training**

***Action:***

*To intensify post-graduate educational course activities in accordance with General Conference resolution GC(XXXVI)/RES/584 on "Education and training*

*syllabuses and training material for specific target groups and specific uses of radiation sources and radioactive materials.*

In the light of the BSS and of a number of other safety standards developed by the Agency, the Secretariat updated the "Standard Syllabus of Post-Graduate Educational Courses in Radiation Protection" (published by the Agency in 1995 in Arabic, Chinese, English, French, Russian and Spanish). The updated standard syllabus, with the title "Standard Syllabus of Post Graduate Educational Courses in Radiation Protection and the Safety of Radiation Sources", will be published (in the six aforementioned languages) early in 2001. The Secretariat — which has organized post-graduate educational courses in Arabic (in the Syrian Arab Republic), English (in Germany, India and South Africa), French (in France and Morocco), Russian (in the Russian Federation) and Spanish (in Argentina) — is planning to increase the frequency of the courses held in those languages and to organize courses also in Chinese.

The Secretariat is drawing upon the standard syllabus to design shorter training events (national and regional courses and workshops) on specialized topics such as the establishment of regulatory frameworks, occupational exposure control, medical exposure control, public exposure control, radioactive waste management, radioactive materials transport, and radiation emergency preparedness and response. Last year, over 40 such training events were organized, mainly within the framework of the Model Project on upgrading radiation protection infrastructure.

To assist Member States in running national and regional training courses, the Secretariat is developing a set of practice/task-specific modules (with — inter alia — syllabuses, lecture notes, guidance for lecturers, visual presentations, suggestions for practical exercises, and sample test questions). The modules are intended primarily for use on a "train-the-trainer" basis. The Secretariat intends to make the modules available to Member States for use by instructors who have attended an Agency post-graduate educational course. The training modules relating to "Basic Concepts of Radiation Protection and the Safety of Sources", "Industrial Radiography" and "Diagnostic X rays" are nearing completion. As a complement to educational courses and training events, the Secretariat is developing distance-learning material and a mechanism for computer-item-based training through the Internet.

The Secretariat is preparing standardized training material for all training in radiation protection and will make it available to relevant organizations in Member States, to lecturers and to participants in training events.

Also, it is standardizing the procedures for the organization of training events. A manual on "*Training in Radiation Protection and the Safe Use of Radiation Sources*" which provides guidance on how to organize training events and how to comply with the training requirements of the BSS was drafted, as well as also a Safety Guide entitled "*Building Competence in Radiation Protection and the Safe Use of Radiation Sources*" which deals with — inter alia — education and training requirements.

***Action:***

*To strengthen, within existing resources, the role of regional training centres and to facilitate co-operation between such centres, on one hand, and national and regional authorities and professional bodies, on the other, with a view to encouraging the harmonization of training for protection against ionizing*

*radiation, the safety of radiation sources and the application of the Basic Safety Standards.*

The Secretariat is standardizing the organizational and administrative procedures for educational and training courses held with Agency assistance at regional and national training centres. Following a meeting early this year of representatives of regional training centres, the Secretariat has started:

- to prepare standardized training material (in Arabic, Chinese, English, French, Russian and Spanish);
- to prepare a long-term programme for training at regional training centres;
- to identify further institutions which might serve as regional training centres;
- to identify institutions in Member States with very extensive experience of providing education and training in radiation protection which might collaborate with regional training centres; and
- to establish a network of regional training centres and collaborating institutions which would assist the Secretariat in the preparation of standardized training material and/or the organization of post-graduate educational courses and specialized training events.

It should be noted, that the resolution GC(44)/RES/13 on *"Education and training in radiation protection and nuclear safety and waste management"*, which was adopted by the Agency's General Conference on 22 September 2000, at its forty-fourth regular session, emphasized *"the importance and role of education and training in establishing and maintaining an adequate radiation protection and nuclear safety infrastructure, including regulatory aspects as stipulated in the Preamble to the BSS"*.

On 11 September 2000 the Board of Governors also authorized the Secretariat *"to continue developing, in a systematic way, syllabuses and training material — and also educational material — for specific target groups and specific uses of radiation sources and radioactive materials and to continue with the activities which it has started in connection with the standardization of the organizational and administrative procedures for educational and training courses held with Agency assistance at national and regional training centres"*.

Therefore, and pursuant to resolution GC(44)/RES/13 (Paragraph 2), the Secretariat is intensifying, within the Agency's available resources, its current efforts to prepare a long-term programme of education and training to be provided at national and regional training centres. In this context it is:

- preparing standardized training material in Arabic, Chinese, English, French, Russian and Spanish;
- establishing a network of regional training centres and collaborating institutions which would assist the Secretariat in organizing post-graduate educational courses and specialized training events; and
- assisting national and regional training centres in conducting educational and training courses in Arabic, Chinese, English, French, Russian or Spanish.

In this connection, the Secretariat requests Member States to inform it of any national training centres and other national institutions (and of any national professional bodies) which might

be able to support its efforts. Relevant communications should be addressed to the Division of Radiation and Waste Safety in the Agency's Department of Nuclear Safety.

**International Undertakings**

*Action:*

*To initiate a meeting of technical and legal experts for exploratory discussions relating to an international undertaking in the area of the safety of radiation sources and the security of radioactive materials.*

The Secretariat convened in March 2000 an Open-ended Meeting of Technical and Legal Experts to undertake exploratory discussions on a possible Code of Conduct on the Safety of Radiation Sources and the Security of Radioactive Materials. A first draft Code of Conduct was produced at this meeting.

A second Open-ended Meeting of Technical and Legal Experts took place in July 2000 and the Chairman's report noted that:

- considerations of safety and security at the end of use of a radioactive source should be considered in regulations, how regulatory requirements should be implemented by the regulatory body and how to best disseminate the requirements of the Code (it was noted that, according to the definition of "regulatory body", such a body need not necessarily possess the legal authority to grant authorizations);
- regarding the scope, the Code should apply to (sealed) radioactive sources , excluding material within the nuclear fuel cycles of research and power reactors", but including "radioactive material released if the (sealed) source is leaking or broken";
- while recognizing that radiation generators have caused a certain number of accidents, it was also recognized that most of the accidents with serious consequences were caused by radioactive sources, and therefore the Code should focus on radioactive sources;
- while certain provisions in the Code did in fact apply to manufacturers, suppliers and users, regulatory activities fell within the domain of States, and that therefore the addressees of the Code should be States;
- States should create comprehensive national registries for radioactive sources under their jurisdiction, but for various reasons such a proposal was deemed not practicable at this time and, consequently, a further proposal that the Agency provide the platform for an international registry, at least initially for radioactive sources in *Category 1 (higher risk)* of the "Categorization of Radiation Sources" was also felt to be premature (noting that there were other fora, including the Agency's policy-making organs, in which this issue could be further pursued);
- concerning the import and export of radioactive sources, it was felt that the main responsibility for the safe management of radioactive sources rested with the *importing* State, which should consent to such an import only if it had the technical and administrative capability needed to manage the source in a safe manner (no agreement was reached regarding any obligations of *exporting* States in this regard); and
- regarding whether unilateral declarations where States would undertake to take the necessary steps to implement the provisions of the Code, it was felt that the Code as such should be an incentive document which may or may not be complemented by

binding legal undertakings and, therefore, it was felt that its mandate was to "undertake exploratory discussions relating to an international undertaking in the area of the safety and security of radiation sources" independent of its legal form.

On 11 September 2000, the Agency's Board of Governors — inter alia — took note of a *Code of Conduct on the Safety and the Security of Radioactive Sources* and requested the Director General of the Agency to circulate it to all States and all relevant international organizations, and pursuant to the resolution GC(44)/RES/11 (paragraph 4), States were invited to take note of the *Code of Conduct* and to consider, as appropriate, means of ensuring its wide application. The *Code of Conduct* references the *Categorization of Radiation Sources*, which was also endorsed separately, and includes the following provision for its dissemination: "Every State should inform public and private organizations and persons involved in the management of radioactive sources, as appropriate, of the measures it has taken to implement this Code and should take steps to disseminate that information widely."

Another action taken by the Board of Governors on 11 September 2000 was to request the Director General to organize consultations on decisions which the Agency's policy-making organs might wish to take, in the light of the report of the Chairman of the open-ended group of technical and legal experts which produced the *Code of Conduct on the Safety and Security of Radioactive Sources*, regarding — inter alia — the application and implementation of the *Code of Conduct* and to make recommendations to the Board.

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